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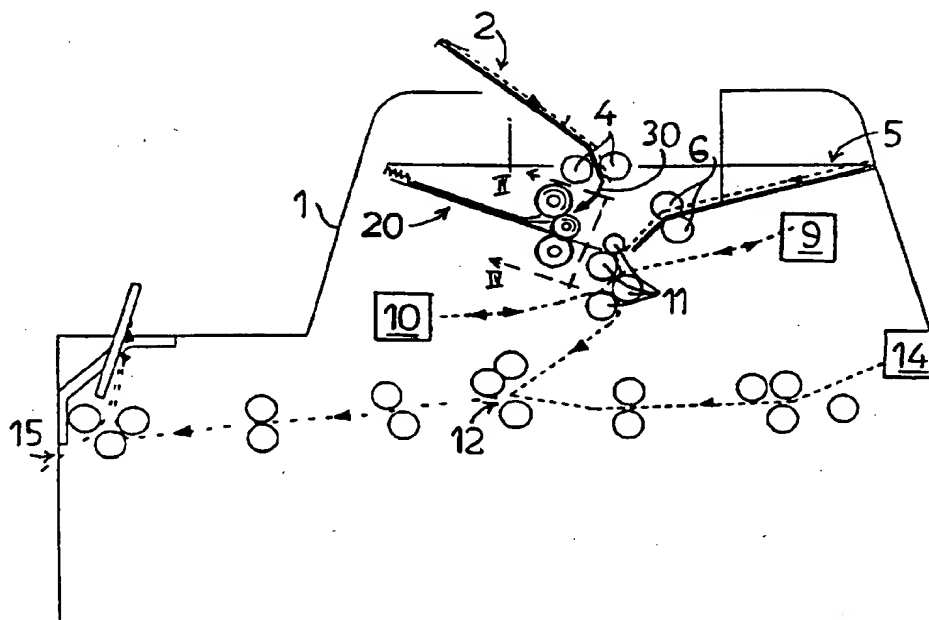
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(21) International Application Number: PCT/GB95/00360 (22) International Filing Date: 21 February 1995 (21.02.95) (30) Priority Data: 9403365.1 22 February 1994 (22.02.94) GB (71) Applicant (for all designated States except US): PRINTED FORMS EQUIPMENT LIMITED [GB/GB]; Oakwood Hill Industrial Estate, Oakwood Hill, Loughton, Essex IG10 3TZ (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): IDDON, Robert, Oliver [GB/GB]; 92 Berners Way, Broxbourne, Hertfordshire EN10 6NP (GB). (74) Agent: W.P. THOMPSON & CO.; Celcon House, 289-293 High Holborn, London WC1V 7HU (GB).		(81) Designated States: CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report.

(54) Title: COLLATING DEVICE FOR MAILING APPARATUS



(57) Abstract

A collating device (20) for a mailing apparatus is arranged to receive successive sheets of a set of sheet material from an input station (2), and to discharge the set for folding, and/or nesting and/or inserting into envelopes within the apparatus.

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COLLATING DEVICE FOR MAILING APPARATUS

The invention relates to a collating device and to mailing apparatus incorporating a collating device.

Known mailing apparatus provides a variety of possibilities for the treatment of sheet material. Typically, sheet material may be drawn from one or two feeding stations and folded one or more times, or sheets from one station can be inserted within folded sheets drawn from the other station. The sheet or sheets so treated may be discharged from the apparatus without further treatment, or may be inserted within envelopes drawn from an envelope feeding station, and the envelopes being then closed and sealed prior to discharge from the apparatus.

Such apparatus function effectively to handle sheet material comprising individual sheets which are each to be treated in the same way. It is not however possible for the apparatus to deal with sheet material in the form of sets, each set comprising for example three sheets which must be handled together.

The invention accordingly provides mailing apparatus capable of carrying out one or more of the functions described above and including a collator device enabling the apparatus to carry out the function or functions in respect of sheet material sets.

The invention also provides a collator device suitable for inclusion in a mailing apparatus of the general kind described above.

A mailing apparatus in accordance with the invention can thus comprise first and second input or feeding stations for sheet material, means for folding sheet material from the or each input station at least once, and/or means for nesting sheet material from the first-mentioned input station, and/or means for inserting sheet material from the first and/or second input station into envelopes from an envelope

hopper, and a collator device for collating sheet material from at least the first input station prior to folding and/or nesting and/or insertion into envelopes.

The invention also provides a collator device suitable for use in such a mailing apparatus, the collator device comprising in-feed means for feeding at least a plurality of sheets in succession to a receiving zone with the or each succeeding sheet overlying the or each sheet previously received at the receiving zone, and means for discharge of the sheets together from the receiving zone.

The infeed and extraction means conveniently have elements in common. Thus two spaced outer rollers or sets of rollers can both co-operate with an inner roller or set of rollers to provide an infeed path between the inner and one of the outer roller or rollers and an extraction or discharge path between the inner and the other of the outer roller or rollers. Both the infeed and discharge operations can then be effected by driving the inner roller or rollers in the same direction.

When incorporated in a mailing apparatus in accordance with the invention, the collator device can be located generally beneath the associated feeding station, the sheets then being guided on a curved or arcuate path to enter the collator device in a direction opposed to that along which they were drawn from the feeding station. Discharge can take place along the entry path, in the reverse direction.

The collator device can include stop means, preferably adjustable to accommodate sheets of different length, defining the end position of the leading edge of sheets being moved into it. The stop means can be spring biased, or constituted by a solenoid operated pusher, to assist discharge.

The invention is further described below, by way of example, with reference to the accompanying drawings, in

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which:

Fig. 1 is a schematic sectional side view of a mailing apparatus incorporating a collating device in accordance with the invention;

Figs. 2 and 3 are schematic sectional side views on a larger scale of the collating device operating the in-feed and feed-out modes respectively; and

Fig. 4 is a partial view of the collator on the line iv-iv of Fig. 1.

The mailing apparatus illustrated in Fig. 1 comprises a housing 1 having at its upper region a first feeding station 2 on which a stack of sheet material could be placed. Each lower-most sheet of such a stack can be conveyed into the interior of the apparatus for further treatment by a feeding means comprising a pair of feed rollers 4. Similarly, sheets can be fed successively into the apparatus from the bottom of a stack of sheet material received at a second feeding station 5, by way of feed rollers 6. Within the mailing apparatus, there are provided folding stations at 9 and 10, at which sheets from the first and/or second feeding stations can be folded together or nested one within another. Thus sheets from the first and second feeding stations 2 & 5 can be brought together to a cluster of feed and guide rollers 11 prior to being guided into the first folding station 9.

The sheet material so treated can be fed directly out of the apparatus, but can instead be inserted at an insert station 12 into envelopes drawing from an envelope feeding station or hopper 14. The filled envelopes can be closed and sealed and then discharged from the apparatus at 15.

The apparatus features and functions so far described are known. The illustrated apparatus differs from prior art apparatus in that it incorporates a collator 20 located directly downstream of the feeding station 2.

The collator device 20 comprises rollers 21 on a shaft

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22, the rollers engaging rollers 24 on a shaft 25. As shown in Figure 2, sheets extracted from the feeding station 2 by the rollers 4 are fed into the collator device between the rollers 21 & 24 by a rotary drive applied to the shaft 25 or shaft 22. The sheets emerge from between the rollers 21 & 24 to enter between a base or lower support plate 27 and an upper or guide plate 29. The arrangement is such that an incoming sheet is inverted relative to its position in the feeding station 2, that is, the lower side of the sheet at the feeding station becomes the upper side of the sheet in the collator device. The path followed by each sheet is curved, as indicated by arrow 30, but once the sheet has fully entered between the plates 27 & 29, it will lie flat so that the next sheet fed in will overlies it.

The shaft 25 mounts not only the rollers 24 but also rollers 31 engaged with rollers 32 on a third shaft 34. As shown in Figure 3, rotation of the shaft 25, in the same direction as before, or rotation in the other direction of the shaft 34, effects discharge of a set of sheets accumulated in the collator device. The discharged set travels generally straight, from between the rollers 31 & 32, over a continuation portion 35 of the base plate 27, towards the rollers 11 at which the set is further treated.

The discharge of an accumulated stack of sheets from the collator device can be assisted by the inclination of the base plate 27 as shown. Additionally or instead, the sheets can be fed in against a stop member 36 at the inner end of the device, the stop member being biased by a spring 37. Alternatively, the discharge can be initiated by a solenoid operated pusher located at the position of the stop member 36, the pusher being actuated at the beginning of each discharge operation.

However constituted, the stop or pusher member is advantageously adjustable in position to accommodate sheet

material of different lengths.

Where the sheet material at the first feeding station 2 consists of identical sheets, each of which is to be treated separately, the apparatus is operated so that the sheets enter the collator device 20 and are discharged from it separately for further treatment within the apparatus, as if the collator were omitted. However, where the sheets at the feeding station 2 comprise sets of sheets, which requires to be treated as a set within the apparatus, the sheets of each set are fed from the feeding station into the collator device in the manner described and accumulated there until a complete set has been assembled in the collated condition.

The discharge operation of the collator device 20 can be arranged to operate after a pre-selected number of sheets have been accumulated in it, this number being preset in accordance with the number of sheets in the set. Alternatively, the final sheet of each set can be marked in a way capable of being read by a sensor provided on the apparatus. Discharge of the set from the collator device is then initiated when the last sheet of each set has entered into it, in response to the sensing by the sensor of the mark carried by the final sheet.

The mailing apparatus described of course includes appropriate driving, timing and control arrangements for its various components, these arrangements being generally conventional, so that detailed description is not required.

The invention can of course be embodied in a variety of ways other than as specifically described.

CLAIMS

1. A mailing apparatus comprising first and second input stations for sheet material, means for folding sheet material from the or each input station at least once, and/or means for nesting and/or collating sheet material from the second input station with that from the first input station, and/or means for inserting sheet material from the first and second input stations into envelopes from an envelope hopper, and a collator device for collating sheet material from the first input station prior to folding and/or nesting/collating with sheet material from the second input station and/or insertion into envelopes.
2. A collator device for use in a mailing apparatus as claimed in claim 1, the collator device comprising infeed means for feeding a plurality of sheets in succession to a receiving zone with the or each succeeding sheet overlying the or each sheet previously received at the receiving zone, and discharging means for discharging the sheets together from the receiving zone.
3. A collator as claimed in claim 2, in which the infeed and discharging means have elements in common.
4. A collator as claimed in claim 3, in which two spaced outer rollers or sets of rollers are each arranged to co-operate with an inner roller or set of rollers, such that at least one inner roller and one of the outer roller or rollers provides the infeed means and at least one inner roller and the other of the outer roller or rollers provides the discharging means, the infeed and discharging means being operable by rotation of the inner roller or rollers in the same direction.
5. A collator as claimed in claim 2, 3 or 4, in which the discharging means is arranged to discharge the sheets along substantially the same path along which the infeed

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mean is arranged to feed the sheets, in the reverse direction.

6. A collator device as claimed in claim 5, in which the receiving zone includes stop means adjustable to accommodate sheets of different length, arranged to define the end position of the leading edge of sheets fed into the receiving zone.

7. A collator as claimed in claim 6, in which the stop means is biased in the discharging direction, to assist discharge.

8. A collator as claimed in claim 7, in which the stop means is spring biased, or constituted by a solenoid operated pusher.

9. A collator device as claimed in any one of claim 2 to 8, incorporated in a mailing apparatus as claimed in claim 1, the collator device being located generally beneath the associated input station, such that the infeed means is arranged to guide the sheets along a curved or arcuate path to enter the collator device along an entry path in a direction substantially opposed to that along which they are arranged to be drawn from the input station.

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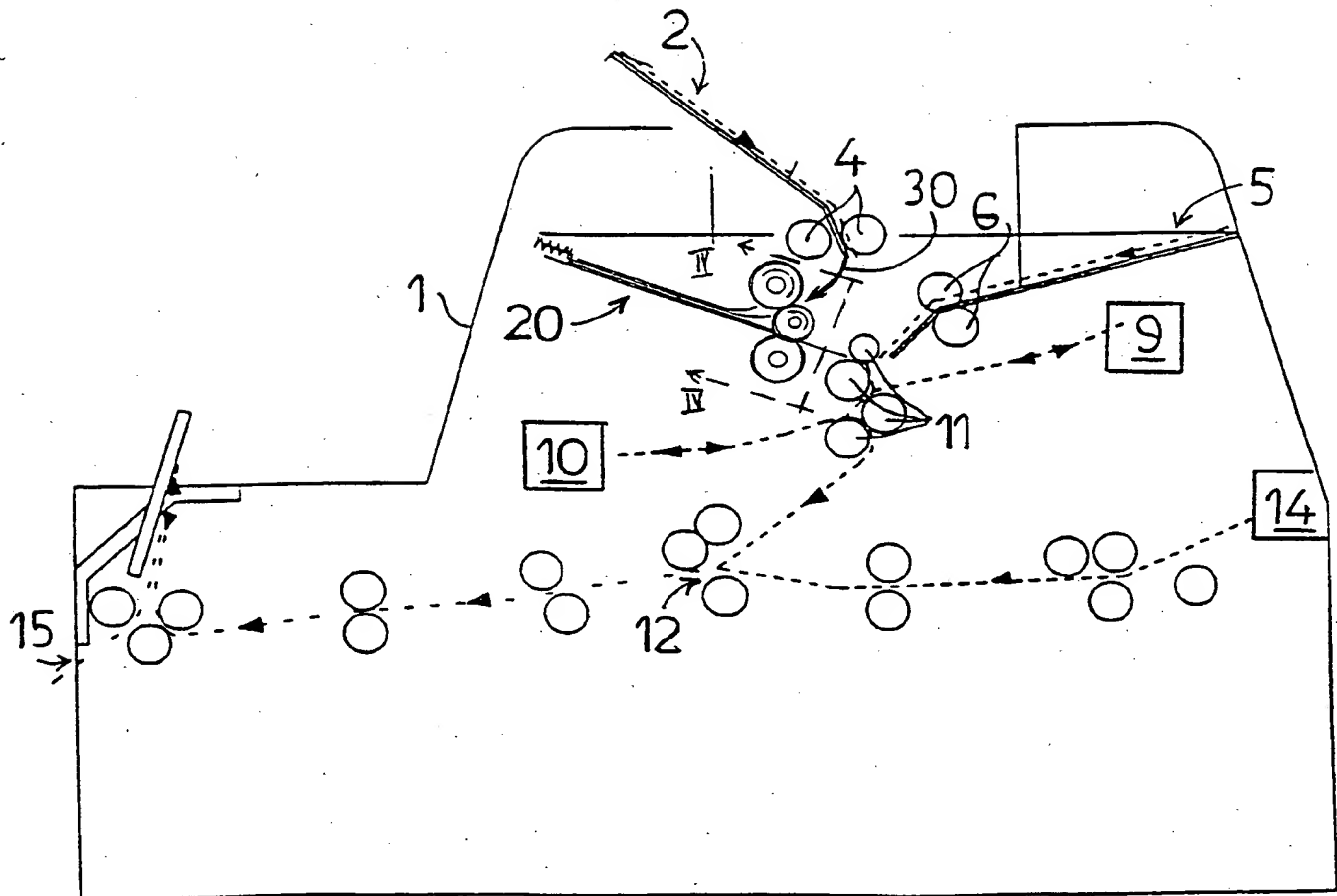


FIG.1

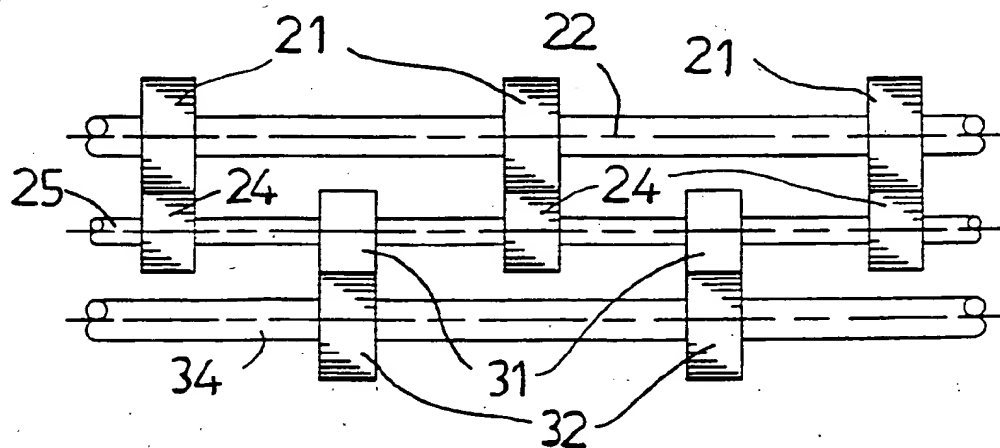
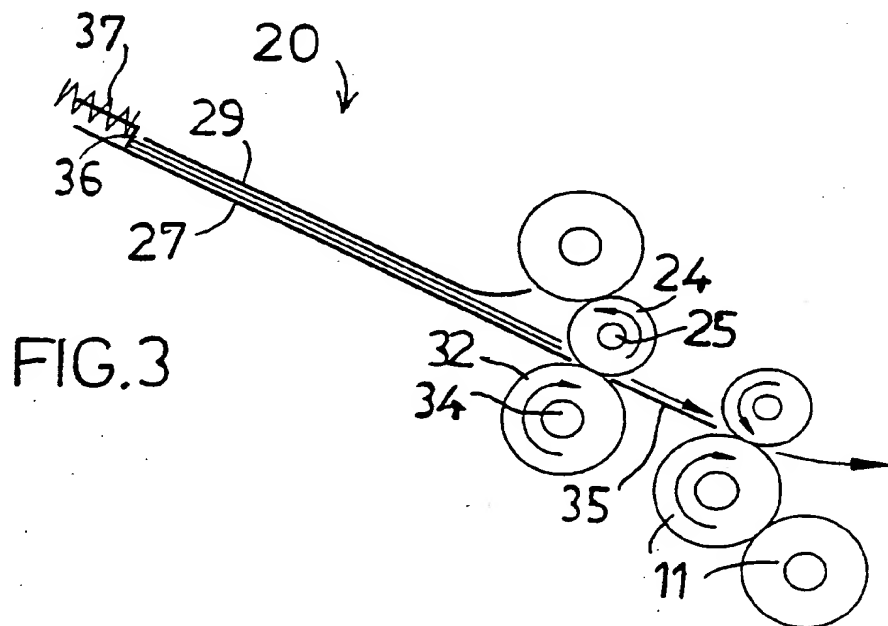
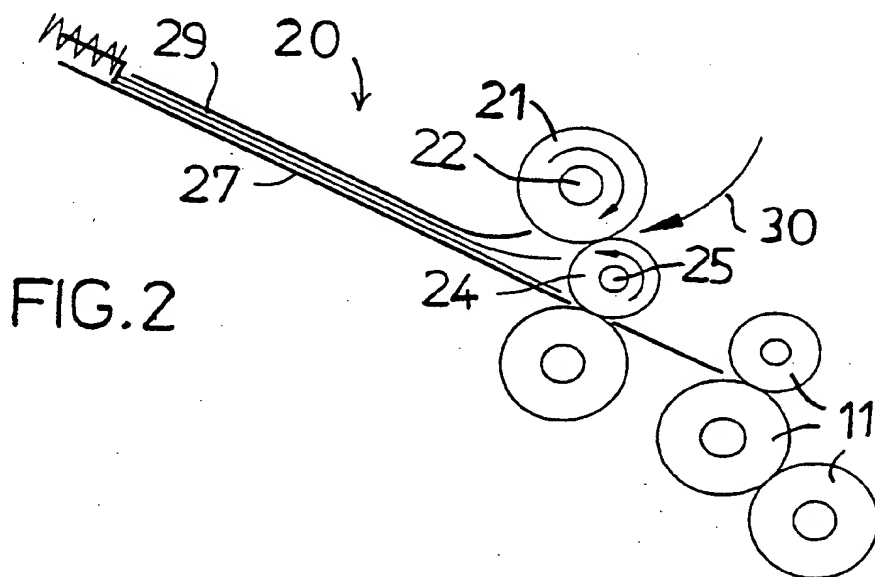


FIG.4



INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 95/00360

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B43M3/04 B65H39/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B43M B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 237 129 (HADEWE B.V.) 16 September 1987 see column 1 - column 6; figures 1,2 ---	1,2,5-9
A	FR,A,875 888 (GEBRÜDER BREHMER) 7 October 1942 see the whole document ---	1-9
A	DE,U,91 04 607 (MATHIAS BÄUERLE GMBH) 20 June 1991 see page 7 - page 14; figures ---	1,2,6,9
A	EP,A,0 014 020 (P & M CO.) 6 August 1980 see page 3, line 29 - page 4, line 19 see page 7, line 16 - page 9, line 33; figure 2 --- -/--	1,2

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US,A,2 668 053 (J. W. BACH) 2 February 1954 see column 3, line 28 - line 60; figure 1 -----</p>	3-6

INTERNATIONAL SEARCH REPORT

International Application No
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FR-A-875888	14-10-42	NONE	
DE-U-9104607	20-06-91	NONE	
EP-A-14020	06-08-80	US-A- 4253651 CA-A- 1142190 JP-A- 55102084 JP-B- 58026075	03-03-81 01-03-83 04-08-80 31-05-83
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